

IAS Critical Design Review



Agenda

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|----------------------------------|--------------------------------|
| • Introduction | R. Schweiss |
| • Design Overview | S. Johnston |
| • Hardware Architecture | C. Brambora |
| • Operational Scenarios | S. Johnston |
| • Software Design | |
| – Overview | J. Hosler |
| – Operations Interface | J. Whelan |
| – Management and Control | A. Williard |
| – Database | A. Williard |
| – L1 Processing | T. Ulrich |
| | J. Storey |
| – Evaluation and Analysis | D. Kaufmann/M. Schienle |
| • System Test | E. Crook |
| • Conclusion | R. Schweiss |



- **Conclusion**

- **Training, Maintenance, and Transition**
- **Open Issues**
- **Risks**
- **IAS Release Plan**
- **Schedule**

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Training, Maintenance, and Transition

- **IAS personnel are working closely with EDC to keep operations and maintenance personnel involved in the IAS design and implementation**
- **IAS Transition Plan will be developed by GSFC with support from EDC to document:**
 - **Transition approach**
 - **Roles and Responsibilities of organizations**
 - **Plan for providing/acquiring products to support transition**
 - **O&M personnel training approach and requirements**
 - **Activities and schedules for transition**
- **The schedule for the IAS Transition Plan is:**
 - **Review: 5/27/97**
 - **Final: 7/1/97**

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Training, Maintenance, and Transition

- **IAS Installation Plan will be developed by GSFC with support from EDC to document:**
 - **Installation strategy, cabling, setup, and checkout**
 - **Organization support required for installation**
 - **Problem report and resolution procedures**
 - **Activities and schedules for installation**
- **Schedule for the IAS Installation Plan is:**
 - **Review 5/27/97**
 - **Final 7/1/97**

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Open Issues

- **During ground testing of the ADS transfer functions were not constant over the operating temperature range. The baseline IAS design assumes one transfer function for each of the three ADS units for use in attitude data processing. The impact of the IAS including a thermal dependence in these transfer functions is as follows:**
 - **Analysis of the ADS test results is required to determine the best way to parameterize the ADS transfer functions, i.e. how should the transfer functions be modified**
 - **IAS will need to add the temperature dependent transfer function coefficients to the Calibration Parameter File**
 - **The attitude processing software that uses the ADS temperature data from the PCD to set up the filter transfer functions will require modifications**

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Risks

- **Development Schedule**
 - There is no schedule slack in the IAS development schedule given the timing of the IAS restructuring.
 - **Mitigation:** Slack will need to be managed by prioritizing requirements. Highest priority functions needed for launch and early check out will be developed first etc. Continue to identify functions that can be deferred until a post launch release (e.g. Sub Interval Processing)
- **Transition to EDC**
 - Given the development schedule and the funding profile, there is insufficient time to properly transition sustaining engineering responsibilities to EDC. If sufficient transition is not provided the system cannot be properly maintained.
 - **Mitigation:** Work with EDC, L7 Project, and NOAA during transition planning to negotiate an acceptable transition schedule



Risks

- **Ground Look Calibration Processing**
 - The Baselined cost and schedule does not include capabilities to Process Ground Look Calibration
 - Mitigation: If Ground Look Processing requirements evolve then cost and schedule impacts will be assessed
- **System Performance**
 - Software application performance on the SGI hardware is not well understood
 - Mitigation: Increase emphasis on prototyping and performance modeling



Rationale

- **Release 1**
 - **Capabilities to support Landsat 7 Ground System Testing activities**
 - **Interfaces to the EDC DAAC and MOC**
 - **Core Level 1 Processing Functionality**
- **Release 2**
 - **Remaining Requirements including all calibration, evaluation, and analysis functions**

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IAS Release Plan

SUBSYSTEM	RELEASE 1	RELEASE 2
IAS Infrastructure User Interface	Operator Interface	
	Analyst Interface	
IAS Infrastructure Data Management	Ingest Level 0R Products from the EDC DAAC	Create subimage files
	Quality Assess Level 0R Products	Correct MSCD and PCD
	Associate Level 0R Product with Work Order	
	Format Files for Transmission to External Systems	Generate Calibration Parameter File
	Ingest Data from MOC	
	Convert Ephemeris	
	Manage Work Order Directories	Manage Disk Space
IAS Infrastructure Process Control	Start Up IAS	
	Schedule Work Order	
	Process Work Order	
IAS Infrastructure Evaluation & Analysis	Display Level 0R Product files (imagery and ancillary data)	
	Display algorithm results - flat files	
	Display algorithm results - database queries	
		Create reports

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IAS Release Plan

SUBSYSTEM	RELEASE 1	RELEASE 2
Radiometric Processing Subsystem	Characterize Level 0R image (Dropped Lines, Impulse Noise, Detector Saturation, Histogram Analysis)	Characterize Level 0R image (Memory Effect, Coherent Noise, Random Noise, Scan-Correlated Shift)
		Correct Level 0R image (Memory Effect, Coherent Noise, Scan-Correlated Shift)
	Process IC Reflective and IC Emissive Data (Generate IC gains and biases)	Process FASC and PASC data (Generate FASC and PASC gains and biases) Generate Combined Radiometric Model (CRaM)
	Generate Level 1R image (Apply Radiometric Correction)	
	Characterize Level 1R image (MTF, Banding and Striping)	
	Correct Level 1R image (Dropped Lines, Dead Detectors, Saturated Detectors, Banding, Striping)	
Geometric Processing Subsystem	Generate 1Gs and 1Gp Image (Create Model, Generate Grid, Call Model, Resample and Terrain Correct)	
		Perform Geometric Calibration (Sensor Alignment, Scan Mirror, Band Placement)
		Perform Geometric Characterization (Geometric Accuracy, Geodetic Accuracy, Image-to-Image Registration, Band-to-Band Registration)

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Division
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Software Sizing Estimates

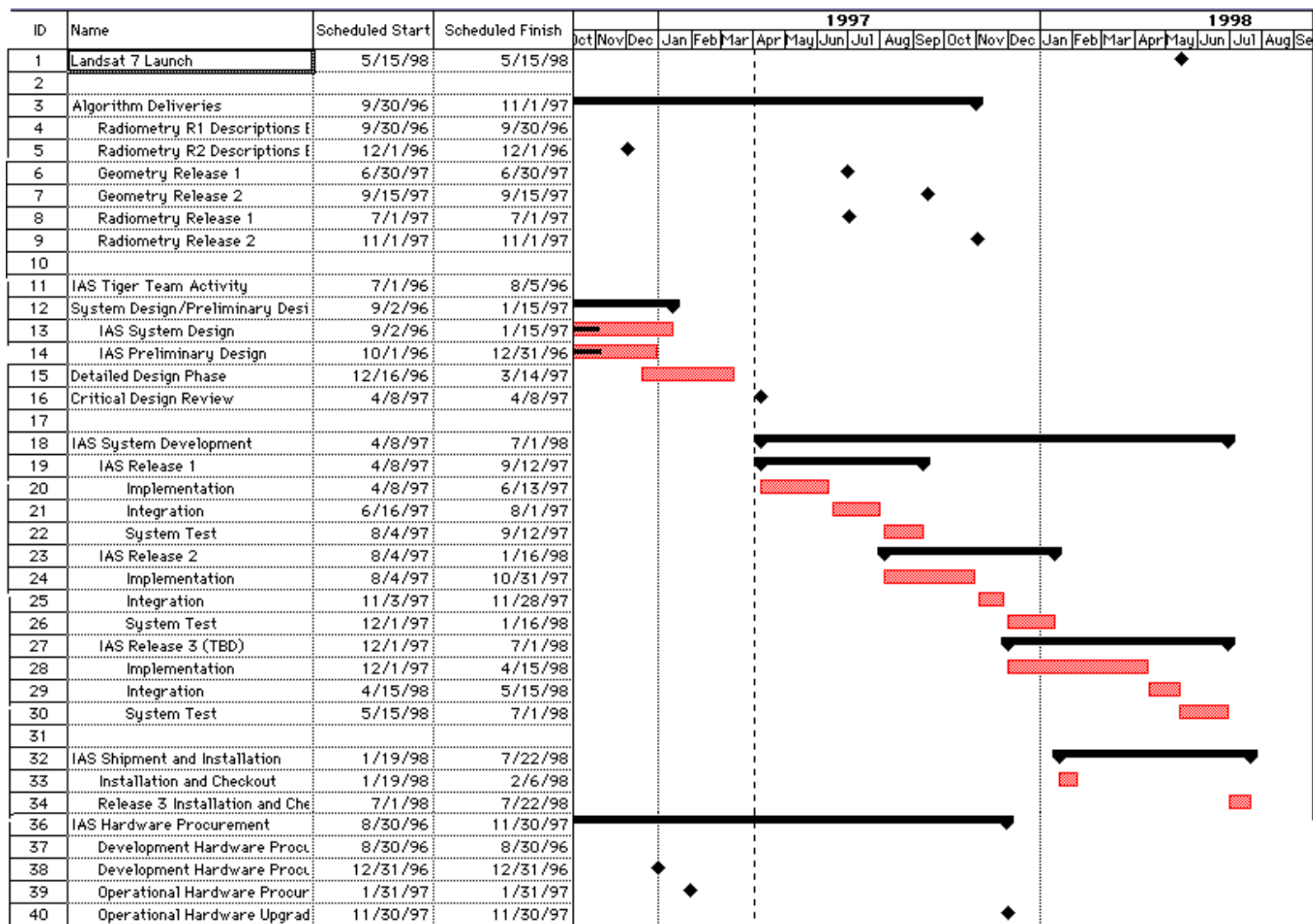
	DSI	Reuse	Release 1	Release 2
Process Control Subsystem (PCS)	1,750	0	1,750	0
Data Management Subsystem (DMS)	8,750	0	3,750	5,000
Evaluation & Assessment Subsystem (EAS)	6,125	0	0	6,125
User Interface (UI)	3,700	0	3,100	600
Database	7,500	0	5,000	2,500
Global & Tools	6,000	0	3,150	2,750
Radiometric Processing Subsystem (RPS)	19,000	5,000	13,425	10,575
Geometric Processing Subsystem (GPS)	16,164	22,776	30,780	8,160
	68,989	27,776	61,055	35,710

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Schedule



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Acronyms

1Gs	Level 1G systematically corrected data	FAC=FASC	Full Aperture Solar Calibrator
1Gt	Level 1G terrain corrected data	FDF	Flight Dynamics Facility
1Rf	Level 1R FASC processed data	FTP	File Transfer Protocol
1Rp	Level 1R PASC processed data	GCP	Ground Control Point
ACCA	Automated Cloud Cover Assessment	GLC	Ground Look Calibration
AN/DN	Ascending Node/Descending Node	GPS	Geometric Processing Subsystem
API	Application promaatic interface	GSFC	Goddard Space Flight Center
AUI	Analyst User Interface	GTSIM	Generic Telemetry Simulator
B-B	Band to Band	GUI	Graphical User Interface
CC	Cubic Convolution	HDF	Hierarchical Data Format
CNMOS	Consolidated Network Management and Operations Support	I-I	Image to Image
COTS	Commercial Off-the-Shelf	IAS	Image Assessment System
CPF	Calibration Parameter File	ICD	Interface Control Document
CRaM	Combined Radiometric Model	IDL	Interactive Data Language
DAAC	Distributed Active Archive Center	IGS	International Ground Station
DAN	Data Availability Notice	L0R	Level-0R product
DB	Database	LOS	Line Of Sight
DDR	Data Definition Record	LPGS	Level 1 Product Generation System
DEM	Digital Elevation Model	LPS	Landsat 7 Processing System
DHF	Data Handling Facility	LSO	Landsat 7 Science Office
DMS	Data Management Subsystem	MBR	Miniumu m Bounding Rectangle
E&A	Evaluation and Analysis	MMO	Mission Management Office
EC S	EOSDIS Core System	MO&DSD	Mission Operations and Data Systems Directorate
EDC	EROS Data Center	MO&SD	Mission Operations and Systems Development
ENVI	Environment for Visualizing Imagery	MOC	Mission Operations Center
ESST	Earth Science Search Tool	MOSDD	Mission Operations and System Development Division
ETM+	Enhanced Thematic Mapper Plus		

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Acronyms (cont'd)

MSCD	Mirror Scan Correction Data	PRT	Product Request Tool
MTF	Modulation Transfer Function	RPS	Radiometric Processing Subsystem
MTFC	Modulation Transfer Function Compensation	SEAS	System Engineering, and Analysis Support
NASA	National Aeronautics and Space Administration	SGI	Silicon Graphics, Incorporated
NN	Nearest Neighbor	SSDM	SEAS System Development Methodology
ODL	Object Description Language	STD	State Transition Diagram
PAC=PASC	Partial Aperture Solar Calibrator	UI	User Interface
PCD	Payload Correction Data	USNO	U.S. Naval Observatory
PCS	Process Control Subsystem		

REVIEW SUBJECT:	CONFIGURATION CONTROL BOARD		NUMBER (FOR CODE 514 CCB USE ONLY)
DATE OF REVIEW:	REVIEW ITEM DISPOSITION		
ORIGINATOR:	ORGANIZATION:	EXTENSION:	
SUBJECT OF COMMENT:			
DOCUMENT TITLE/NUMBER:			
DESCRIPTION OF PROBLEM:			
ORIGINATOR'S RECOMMENDATION:			
IMPACT IF RECOMMENDATION NOT ACCEPTED:			
ACTIONEE'S RESPONSE:			
NAME OF ACTIONEE:	SIGNATURE:	DATE:	
DISPOSITION			
<input type="checkbox"/> APPROVED AS WRITTEN <input type="checkbox"/> APPROVED WITH MODIFICATIONS <input type="checkbox"/> DISAPPROVED			
REVIEW BOARD CHAIRMAN:		DATE:	